Execution Plan for Small Projects

at the
Collider-Accelerator Department
at
Brookhaven National Laboratory
Upton, NY

for the
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CHANGE LOG*

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0	entire document	Feb-11
1	pp 5-11	May-13

***This change log is for the main document. For changes to an attachment, please go to the attachment in question.**

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1 INTRODUCTION

Brookhaven National Laboratory (BNL), located in Upton, NY, is owned by the U.S. Department of Energy (DOE) and operated by Brookhaven Science Associates (BSA) under the U.S. Department of Energy Contract No. DE-AC02-98CH10886. The flagship Nuclear Physics facility at BNL is the Relativistic Heavy Ion Collider (RHIC).

The Execution Plan for Small Projects (EPSP) describes the coordination of efforts of project teams at the Collider-Accelerator Department (C-AD) to ensure that projects are completed on time and within budget. Attachments to this document define the scope, work breakdown structure (WBS) and schedule for project-like initiatives which fall below the $10M threshold the DOE uses to define projects (reference DOE Order 413.3B).

2 MANAGEMENT

Funding for these projects will be directed through BNL's Collider-Accelerator Department. Fiscal and management responsibility for fabrication of the projects will reside with the Chairman, Thomas Roser.

Responsibilities

The Chairman for the Collider-Accelerator Department at BNL shall be administratively and fiscally responsible for the projects. This encompasses the following:

- Provides overall management oversight for all aspects of the projects.
- Appoints the Project Manager.
- Approves key personnel appointments made by the Project Manager.
- Approves major subcontracts recommended by the Project Manager.
- Ensures that adequate staff and resources are available to complete the projects in a timely and cost effective manner (within constraints of the budget provided).
- Ensures that the projects have demonstrated that they meet the functional requirements.
- Provides documentation and access to information necessary for operation of the projects at other sites, if applicable.
- Ensures the work is performed safely and in compliance with the ISM rules.

The Program Manager:

- Manages of all aspects of the project
- Appoints key personnel
- Recommends major subcontractors
- Estimates staff and resources to complete the project
- Leads the technical design to meet the functional requirements
- Develops risk management plans
- Provides technical and project documentation
- Ensures compliance with all environmental, safety, and health rules
- Schedules safety and performance reviews

3 ANALYSES, ASSESSMENTS AND PLANS

3.1 Environment, Safety and Health

3.1.1 Purpose of the ESSH Chapter

The purpose of this chapter is to briefly describe the rigorous environmental protection, safety, security, health and quality (ESSH) activities associated with the projects that will be completed prior to commencement of construction, commissioning and operations.

3.1.2 Review of ESSH Issues Associated with Project Design

At the design stage, C-AD personnel plan, develop, define and control the design of the C-A facilities and its components in a manner that assures consistent achievement of safety, environmental protection and mission objectives. To assist in determining the necessary ESH reviews for a project, each Project Manager/Project Physicist/Project Engineer must complete a C-AD Design Review Questionnaire. The questionnaire identifies required documents, approvals, calculations, drawings, materials certifications, variances and procedures need to complete the project. The questionnaire also identifies any required safety reviews by standing C-AD or BNL ESH review committees.

For example, the Collider-Accelerator Department's Radiation Safety Committee will review facility-shielding configurations designs (if applicable) to assure that the shielding has been designed to:

- Prevent contamination of the ground water.
- Limit annual site-boundary dose equivalent to less than 5 mrem.
- Limit annual on-site dose equivalent to inadvertently exposed people in non-Collider-Accelerator Department facilities to less than 25 mrem.
- Limit dose equivalent to any area where access is not controlled to less than 20 mrem during a fault event.
- Limit the dose equivalent rate to radiation-workers in continuously occupied locations to ALARA but in no case greater than 0.5 mrem in one hour or 20 mrem in one week.
- Limit the annual dose equivalent to radiation workers where occupancy is not continuous to ALARA, but in no case to exceed 1000 mrem.

In addition to review and approval by the Radiation Safety Committee, the Radiation Safety Committee Chair or the ESSHQ Associate Chair must approve final shielding drawings. Shielding drawings are verified by comparing the drawings to the actual configuration. Radiation surveys and fault studies are conducted after the shielding has been constructed in order to verify the adequacy of the shielding configuration. The fault study methodology that is used to verify the adequacy of shielding is described and controlled by Collider-Accelerator Department procedures.

The DOE ESHQ requirements applicable to Small Projects at C-AD's accelerator facilities are listed in Table 3-1. All non-standard industrial hazards, including radiological hazards, associated with accelerator facilities are addressed comprehensively in DOE Order 420.2C, Safety of Accelerator Facilities. Appropriate and adequate protection of workers, the public, and the environment from ionizing radiation are also covered under 10CFR835, Occupational Radiation Protection, which applies to all DOE facilities regardless of the source and type of ionizing radiation. Protection against routine industrial hazards is covered in 10CFR851, Worker Safety and Health Program . The C-A Department implements the DOE requirements indicated in Table 3-1 using procedures and training. At the BNL level, the Standards Based Management System (SBMS) is used to keep DOE requirements current and to flow requirements down to the Department level. At the C-A Department level, SBMS requirements are flowed down into routine operations procedures. All ESHQ requirements and hazard controls are documented in detail in the C-A Operational Procedures (OPM).

In order to meet the requirements in DOE Order 420.2B, Safety of Accelerator Facilities, C-AD incorporates a description and safety assessment of new equipment into the current Safety Assessment Document (SAD) for C-AD. At the appropriate time, the C-A Department obtains an approved Accelerator Safety Envelope for new equipment from DOE and performs an Accelerator Readiness Review in accord with Order 420.2B prior to commissioning and operations.

Table 3-1 Significant DOE ESHQ Requirements for BNL Accelerators

Topic	DOE Requirements Document
Authorization Basis Documents	DOE O 420.2C, Safety of Accelerator Facilities DOE O 420.1A, Facility Safety (Natural Phenomenon and Fire Protection Sections)
Conduct of Operations	DOE O 422.1, Conduct of Operations Requirements for DOE Facilities
Quality Assurance	DOE O 414.1D, Quality Assurance
Maintenance Management	DOE O 430.1B, Ch. 2, Real Property Asset Management
Training and Qualification Programs	DOE O 420.2C, Safety of Accelerator Facilities
Radiation Protection	10CFR835, Occupational Radiation Protection
Transportation and Packaging	DOE O 460.2A, Departmental Materials Transportation and Packaging Management
Worker Protection	DOE O 450.2, Integrated Safety Management 10CFR851, Worker Safety and Health Program
Environmental Protection	DOE O 451.1B Chg 3, National Environmental Policy Act Compliance Program - Change 1
ESH Reporting	DOE O 231.1B, Environment, Safety, and Health Reporting
Accident Investigation	DOE O 225.1B, Accident Investigations
Radioactive Waste Management	DOE O 435.1 Chg 1, Radioactive Waste Management

The C-A Department also conforms to the requirements of ISO 14001, Environmental Management System, and OHSAS 18001, Occupational Safety and Health Management System, and achieves third-party registration for these internationally recognized management systems. Thus, in addition to DOE requirements, documentation of environmental protection and occupational safety and health programs for new facilities and projects are prepared and audited by independent parties. This documentation includes:

- Environmental Process Evaluations for all processes with significant environmental aspects
- Facility Risk Assessments for all facilities and areas
- Job Risk Assessments for all jobs

DOE O 420.1A, Facility Safety, has two sections that are applicable to accelerator facilities: Natural Phenomenon and Fire Protection Sections. DOE STD-1020-2002, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy

Facilities, describes the Performance Criteria (PC) to be used for evaluating building design for earthquake, wind and flood phenomena. DOE-STD-1020-2002 employs the graded approach in assigning PC categories to DOE buildings. The graded approach enables cost-benefit studies to be used to address categorization. BNL is currently using PC1 for all existing C-AD facilities for life safety issues; however, all projects are reviewed and categorized according to their own unique details.

Significant environmental aspects of new equipment could include:

- Excavation
- Chemical Storage/Use
- Liquid Effluent
- Airborne Effluents
- Hazardous Waste
- Radioactive Waste
- Radiation Exposures
- New or Modified Federal/State Permits

If cooling water is used, the existing New York State Pollutant Discharge Elimination System (SPDES) permit would be revised, as necessary, based on the disposition of cooling tower discharge. Discharge of contaminants to the ground or to the sanitary system would be neither planned nor expected. The closed loop cooling system would be connected to the cooling tower via a heat exchanger. Cooling-tower water would be treated either with ozone or with biocides and rust inhibitors, and would meet all SPDES effluent limits.

If airborne emissions result from facilities or projects, then the National Emission Standards for Hazardous Air Pollutants (NESHAPS) is implemented. Examples of sources that are identified and assessed include point sources such as stacks, diffuse sources such as activated air from accelerator enclosures, and bench-top work conducted in ventilation hoods.

3.1.3 ESSH Plans for Construction

All requests for goods or services are processed through a formal and well-documented system of review to incorporate any special ESSH requirements of the contractor or vendor. BNL reviews the proposed contract scope of work using the Work Planning and Control for Experiments and Operations Subject Area (Work Planning & Control). Building modification and utility drawings for new equipment are sent to the BNL's Safety and Health Services Division for review by the appropriate Environment, Safety and Health (ES&H) disciplines.

C-AD defines the scope of work for each project with sufficient detail to provide reviewers and support personnel with a clear understanding of what is needed, expected, and required. This includes the type of work to be performed, location of work, defined contract limits, allowed access routes, and any sensitive or vulnerable laboratory operations or infrastructure that may be impacted by this work. The C-AD ensures that

facility hazards are characterized and controls implemented specific to the expected construction location and activities.

BNL and C-AD ensure that minimum ESSH competency requirements for contractors are detailed and provided to the Procurement & Property Management Division (PPM). PPM includes those requirements in the bid and contract documents to qualify contractors for award. Competency requirements are consistent with the project, facility and job to be performed.

3.1.4 ESSH Plans for Commissioning, Operations and Decommissioning

The C-AD identifies hazards and associated on-site and off-site impacts to workers, the public and the environment from the C-AD accelerator facilities and projects for both normal operations and credible accidents. Sufficient detail is provided in a C-AD Safety Assessment Document (SAD) to ensure that C-AD has performed a comprehensive hazard and risk analysis. The amount of descriptive material and analysis in the SAD relates to both the complexity of the facility and the nature and magnitude of the hazards. In addition, the SAD provides an understanding of radiation risks to the workers, the public and the environment.

The C-AD SAD follows the generally accepted principles identified in DOE Order 420.2C. Prior to commissioning, or operations, an independent Accelerator Readiness Review is performed for accelerators,. For projects that are not accelerators, a BNL Operatioanl Readiness Evaluation is performed. All equipment and systems created/upgraded by a Small Project are the subject of a separate and distinct Hazard Analysis at the onset of the project. For projects that have non-standard industrial hazards, a safety analysis is perfomed and credited controls or engineered safety systems are defined and configuration controlled.

Post-operations activities would include a transition period, deactivation, decommissioning and remedial surveillance and maintenance activities. These activities will require development of a written plan that meets whatever requirements are in place at the time of post-operations. For large projects, the expectation for a post-operations plan would be that it follows the principles of DOE O 430.1B, Ch. 2, Life Cycle Safety Asset Management.

3.2 PROJECT QUALITY ASSURANCE PROGRAM

3.2.1 Program

The project, through the Collider-Accelerator (C-A) Department, shall adopt in its entirety the BNL Quality Assurance (QA) Program. This QA Program describes how the various BNL management system processes and functions provide a management approach, which conforms to the basic requirements defined in DOE Order 414.1D, Quality Assurance.

The quality program embodies the concept of the “graded approach” i.e., the selection and application of appropriate technical and administrative controls to work activities, equipment and items commensurate with the associated environment, safety and health

risks and programmatic impact. The graded approach does not allow internal or external requirements to be ignored or waived, but does allow the degree of controls, verification, and documentation to be varied in meeting requirements based on environment, safety and health risks and programmatic issues.

The BNL QA Program would be implemented within the projects using C-A QA implementing procedures. These procedures supplement the BNL Standards Based Management System documents for those QA processes that are unique to the C-A Department. C-A QA procedures are developed by C-A QA and maintained in the C-A Operations Procedures Manual (Chapter 13: ESSHQ Division).

The C-A QA philosophy of adopting the BNL Quality Program and developing departmental procedures for the implementation of quality processes within C-A ensures that complying with requirements will be an integral part of the design, procurement, fabrication, construction and operational phases of the projects.

A Quality Representative has been assigned to serve as a focal point to assist C-A management in implementing QA program requirements. The Quality Representative has the authority, unlimited access, both organizational and facility, as personnel safety and training allows, and the organizational freedom to: assist line managers in identifying potential and actual problems that could degrade the quality of a process/item or work performance, recommend corrective actions, and verify implementation of approved solutions. All C-A personnel have access to the Quality Representative for consultation and guidance in matters related to quality.

3.2.2 Personnel Training and Qualifications

The BNL Training and Qualification Management System (Training and Qualifications) within the Standards Based Management System supports C-A management's efforts to ensure that personnel working on the projects are trained and qualified to carry out their assigned responsibilities. The BNL Training and Qualification Management System (Training and Qualifications) is implemented within the C-A Department with the C-A Training and Qualifications Plan of Agreement (Training Plan).

3.2.3 Documents and Records

The BNL Records Management System (Records Management) and controlled document Subject Areas within SBMS, supplemented by C-A procedures, provide the requirements and guidance for the development, review, approval, control and maintenance of documents and records.

C-A documents encompass technical information or instructions that address important work tasks, and describe complex or hazardous operations. They include plans, and procedures, instructions, drawings, specifications, standards and reports.

3.2.4 Work Process

Work is performed employing processes deployed through the BNL SBMS. SBMS Subject Areas are used to implement BNL-wide practices for work performed. Subject

Areas are developed in a manner that provides sufficient operating instructions for most activities. However, C-A management has determined that it is appropriate to develop internal procedures to supplement the SBMS Subject Areas. These C-A procedures are bounded by the requirements established by the BNL Subject Areas.

Group leaders and technical supervisors are responsible for ensuring that employees under their supervision have appropriate job knowledge, skills, equipment and resources necessary to accomplish their tasks. Where applicable, contractors and vendors are held to the same practices.

3.2.5 Design

Design planning shall establish the milestones at which design criteria, standards, specifications, drawings and other design documents will be prepared, reviewed, approved and released. The design criteria shall define the performance objectives, operating conditions, and requirements for safety, reliability, maintainability and availability, as well as the requirements for materials, fabrication, construction, and testing. Appropriate codes, standards and practices for materials, fabrication, construction, testing, and processes shall be defined in the design documentation. Where feasible, nationally recognized codes, standards and practices shall be used. When those are either overly restrictive, or fall short of defining the requirements, they shall be modified, supplemented, or replaced by BNL specifications.

Specifications, drawings and other design documents present verifiable engineering delineations in pictorial and/or descriptive language representations of parts, components or assemblies for the project. These documents shall be prepared, reviewed, approved and released in accordance with C-A procedures. Changes to these documents shall be processed in accordance with the C-A configuration management program.

3.2.6 Procurement

Personnel responsible for the design or performance of items or services to be purchased shall ensure that the procurement requirements of the purchase request are clear and complete. Using the graded approach, potential suppliers of critical, complex, or costly items or services shall be evaluated in accordance with predetermined criteria to ascertain that they have the capability to provide items or services which conform to the technical and quality requirements of the procurement. The evaluation shall include a review of the supplier's history with BNL or other DOE facilities, or a pre-award survey of the supplier's facility. C-A personnel shall ensure that the goods or services provided by the suppliers are acceptable for intended use.

3.2.7 Inspection and Acceptance Testing

The BNL Quality Management System within the SBMS, supplemented by C-A procedures, provides processes for the inspection and acceptance testing of an item, service or process against established criteria and provides a means of determining acceptability. Based on the graded approach, the need and/or degree of inspection and acceptance testing shall be determined during the activity/item design stage. Inspection/test planning has as an objective the prompt detection of non-conformances that could adversely affect performance, safety, reliability, schedule or cost.

4 CONTROLS AND REPORTS

The Small Projects' cost and progress information is reviewed monthly by the Project Managers and the Department Chairman. Monthly milestone status reports were provided as required for the American Recovery and Reinvestment Act (ARRA) funded projects. Quarterly reports are provided to DOE-NP. Technical performance is monitored throughout the project to ensure conformance to approved functional requirements. Design reviews and performance testing of the completed systems are used to ensure that the equipment meets the functional requirements.